MEMORANDUM

TO: Commissioners
FROM: Steven J. Tambini
DATE: December 2015

RE: **Water Resources Plan for the Delaware River Basin — FY 2015 Achievements**

This is our 11th issue of the annual report on progress toward achieving the Key Result Area (KRA) goals of the *Water Resources Plan for the Delaware River Basin* (Basin Plan). The variety of programs and projects illustrates how the focused efforts of agencies and local partners continue to restore and protect our water resources and maintain the Delaware River as a system of national significance.

HIGHLIGHTS

In the past year, the basin has been the focus of an unprecedented effort to coordinate funding and action for the restoration and conservation of water resources. In this edition we provide an overview of the initiatives that are providing both the funding and the organization to engage a consortia of organizations in watershed projects. As always, we report the efforts by aligning them with the five Key Result Areas identified in the Basin Plan, but many efforts are highly integrated and effectively implement goals under several KRAs. There are still plenty of independent projects going on, too, and we provide examples.

Highlights below, details inside for more on these major stories:

- **PHILADELPHIA'S NOVEL WATER RESOURCE PROJECTS**

  The City of Philadelphia is employing novel approaches to stormwater management and instream water quality. Details in KRA 1.

- **IN THE WAKE OF *ATHOS I***

  While the *Athos I* oil spill is more than a decade behind us, it's been only 5 years since $27.5 million in funds from a Natural Resource Damage Assessment (NRDA) were released from the National Pollution Funds Center. The monies were earmarked for 10 Delaware River restoration projects to restore conditions for fish, birds, sensitive habitats, wildlife and recreational use of the impacted areas. Read about completed projects in KRA 2.

- **ON FOOT OR BY PADDLE, IT'S ALL ABOUT TRAILS, TRAILS, TRAILS!**

  Read all about 'em in KRA 3.

- **UNPRECEDENTED COLLABORATION**

  Read about how investing for water quality is intensifying in the Delaware River basin in KRA 4.

- **ADVANCING STEWARDSHIP**

  Read about how education and outreach projects are making a difference in KRA 5.


Schuylkill River Trail

1.0 SUSTAINABLE WATER USE AND SUPPLY

1.1 EQUITABLY BALANCE DEMANDS

1.2 ENSURE ADEQUATE SUPPLY OF SUITABLE QUALITY WATER FOR ECOSYSTEMS

1.3 ENSURE ADEQUATE SUPPLY OF SUITABLE QUALITY WATER FOR PUBLIC & COMMERCIAL NEEDS

1.4 ENSURE ADEQUATE & SUITABLE QUALITY FLOW FOR RECREATION

Venice Island Water Park

The Venice Island Water Park (VIWP) is a unique effort by the Philadelphia Water Department to protect and improve the City's drinking water sources. The $45 million project is a sustainable, ecologically sensitive stormwater management and riverbank restoration design that provides needed open space as well as a social and cultural hub for Manayunk. Within the Schuylkill River Trail, VIWP features state of the art urban structures for water retention, including a four million gallon subsurface basin (the size of 180 SEPTA buses) that can store sanitary sewer storm flow before it is pumped to a treatment plant. Recreation facilities include an amphitheater, play areas, a "sprayground," athletic fields, outdoor sculptures, and a 250 seat performing arts center. The project showcases links between natural processes and urban infrastructure, incorporating the hydrologic dynamics of the riparian landscape with the man-made environment of the industrial age.
http://www.phillywatersheds.org/category/blog-tags/venice-island

Figure 1: TOP: Concept for Venice Island where the Schuylkill flows past Philadelphia's Manayunk neighborhood.
BOTTOM: The Water Park is part of the Venice Island Performing Arts and Recreational Center. The site doubles as infrastructure for storing storm and wastewater to improve Schuylkill River water quality.
Images: Philadelphia Water Department

Freshwater Mussels Deliver More Benefits than Wastewater Treatment Plants

During warm seasons, a single freshwater mussel can filter 20+ gallons a day as they feed, in effect, functioning as a mini-water treatment plant. One Southeast PA mussel bed studied removed 26 metric tons of solids from the water (equal to five adult elephants) in a single summer season. Also, their feeding process removes pollution and harmful pathogens. Dense mussel beds help stabilize streambed sediments during high flows when burrowed in creeks and rivers, create habitat for aquatic invertebrates. Over time, mussels are a good biological indicator of stream conditions. Yet some mussels are among the most endangered species in the country.

Figure 2: The change is visible to families visiting the PDE exhibit during PA Coast Day. Mussels transform 'dirty' water on the left to 'clean' water on the right. A 530-square-foot mussel hatchery will soon be installed at the Fairmount Water Works Interpretive Center on the Schuylkill.
Photo: Partnership for the Delaware Estuary.

With a $300,000 grant from The Pew Center for Arts & Heritage, Philadelphia Water intends to reverse the mussels' demise by building a 530-square-foot living freshwater mussel enclave at the Fairmont Water Works. The *Rivers Restoration Project: A Freshwater Mussel Hatchery* will be an interpretive,

multi-media installation that combines science, history, and design in a site-specific hatchery that will exhibit the critical role mussels play in restoring and maintaining water quality. In addition to the on-site mussel hatchery, the project will also include a mobile mussel nursery to be taken into schools. The Water Works hatchery, the first project of its kind in the region, could help fuel interest in a much larger commercial hatchery that would work to filter water--reducing the workload at treatment plants—while providing young mussels for future regional reseeding efforts.
http://www.pcah.us/grants/9822_the_rivers_restoration_project_a_freshwater_mussel_hatchery

DRBC Releases Updated Water Resource Planning Model

This spring, DRBC released the Delaware River Basin-Planning Support Tool (DRB-PST), an updated modeling tool that allows the public to test flow management scenarios against a set of existing targets, regulations, and laws governing water use within the Delaware River Basin. The DRB-PST modeling tool is intended to support a more comprehensive public understanding of the effects of reservoir and flow management operating plans on river flows and related aquatic habitat. It will allow interested parties to use a science-based tool to compare impacts of 'what if' scenarios on multiple and complex water resource goals. DRBC staff worked collaboratively with the four states, New York City and Philadelphia to ensure that the DRB-PST produces accurate results that are comparable to those employed by NYC for daily for reservoir operations.
http://www.nj.gov/drbc/home/newsroom/news/approved/20150407_newsrel_drb-pst.html

Figure 3: NYC's Cannonsville reservoir,

NYC *Water-On-the-Go* Program Spouts Fountains

To promote the high quality of NYC's award winning tap water, the NYC DEP in collaboration with community groups and green markets expanded its summertime portable water fountain program this year. The easily spotted NYC Drinking Water fountains are placed in pedestrian-friendly areas and parks around all five boroughs, as well as flagship locations such as City Hall, though Labor Day. One of the goals of the program is to introduce public tap water as the healthy and sustainable alternative to sugary drinks and bottled water. A weekly schedule with detailed times and locations was available on DEP's website to make it simple for everyone to get into the habit of refilling their own water bottles.
http://www.nyc.gov/html/dep/html/drinking_water/wotg.shtml

Fig. 4: NYC invites the public to celebrate its high quality drinking water by making it freely available during hot summer months.
Photos: NYC DEP

2.0 WATERWAY CORRIDOR MANAGEMENT

2.1 FLOOD WARNING, MITIGATION AND MANAGEMENT
2.2 ENHANCEMENT OF WATER-BASED RECREATION
2.3 PROTECTION & RESTORATION OF RIPARIAN ECOSYSTEMS

❖ In the Wake of *Athos I*. . .

Figure 5: The Athos 1 lists to starboard on Nov. 27, 2004, the day after the spill began.

Photo: NOAA

In 2004, the 750-foot tanker *Athos I* struck a submerged anchor, discharging 265,000 gallons of oil and closing 115 miles of the River to commercial traffic for more than a week. Two hundred and eighty miles of Estuary shoreline, thousands of water fowl and acres of river bottom were coated in sludge. In the short 5-years since the Natural Resource Damage Assessment was tallied, half of the 10 identified projects are complete, two are in progress, and three remain in the development stage.

♦ Transformation Complete at Lardner's Point

Photos: Figure 6: Lardner's Point, before (above) and after (below) its restoration.

Photo: NOAA

With funding from the Athos spill, wildlife habitat and a public park have been created at Philadelphia's once-blighted Lardner's Point. Functioning riparian habitat has replaced deteriorated concrete, invasive species and a dilapidated ferry dock on this abandoned industrial site proximate to the Tacony-Palmyra Bridge. The 4.5 acre site now has an intertidal marsh and wet meadow habitat that also provides a scenic public spot along the River for wildlife viewing and fishing. Even the endangered Eastern red-bellied turtle has been seen visiting Lardner's Point Park's restored shoreline

https://darrp.noaa.gov/oil-spills/mt-athos-i

♦ Darby Creek Running Free

Athos funds financed the removal of three dams along Darby Creek in PA, restored 2.6 miles of habitat to improve creek health in the upper stream, and re-established a connection with its lower 9.7 miles and the Delaware River. Darby Creek can once again function as habitat for not only local resident species, but also for American shad and other anadramous fish. Plus, channel realignment decreases energy and reduces flooding.

Figure 7: Removal of Darby Creek dams improves habitat, aids local flood control and improves water quality.

Photo: L. Craig, American Rivers

♦ Blackbird Reserve Wildlife Area Is for the Birds

Referred to as one of the most ecologically valuable spots remaining on the Delmarva Peninsula, this unspoiled area has changed little since the arrival of the first Europeans in the 1600s. Following the loss of thousands of birds as a result of the Athos spill, re-establishing the avian population was a primary goal. Almost forty-two acres of former farmland was converted to pasture, shallow wetlands and food plots for migratory geese.

Figure 8: Blackbird Reserve Wildlife Management Area along the Atlantic flyway restored for migratory geese habitat.

Photo: NOAA

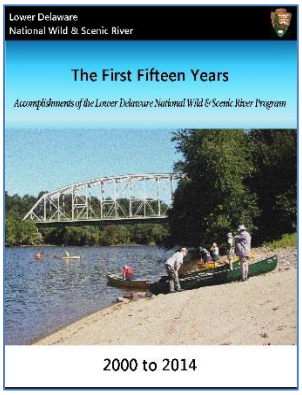
♦ Restoration of Mad Horse Creek Wildlife Management Area

Figure 9: Glossy Ibis flock to an accidental wet meadow, left by the farmer's plow. Salem Nuclear Power Plant in the distance.
Photo: NOAA

Located at the southwestern tip of NJ's Southern Piedmont Plains, the brackish and freshwater tidal marshes, tidal flats, forested wetland complexes and slow moving streams make this tidal freshwater marsh among the state's most rare yet most valuable habitat types. Restoration of 60 acres of marshland, as well as the creation of 35 acres of wet meadow and 100 acres of grassland will commence after review of the recently completed Phase 1 archaeological survey. Initial findings have uncovered indications of Lenape and early European settlement historical artifacts.

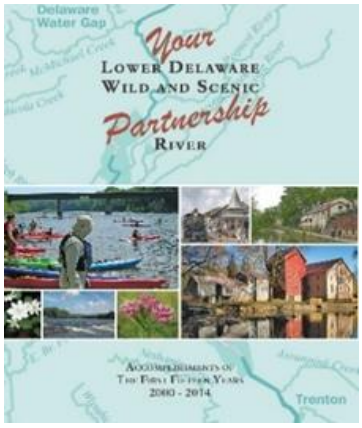
15-Year Accomplishments of the Lower Delaware National Wild & Scenic River Program

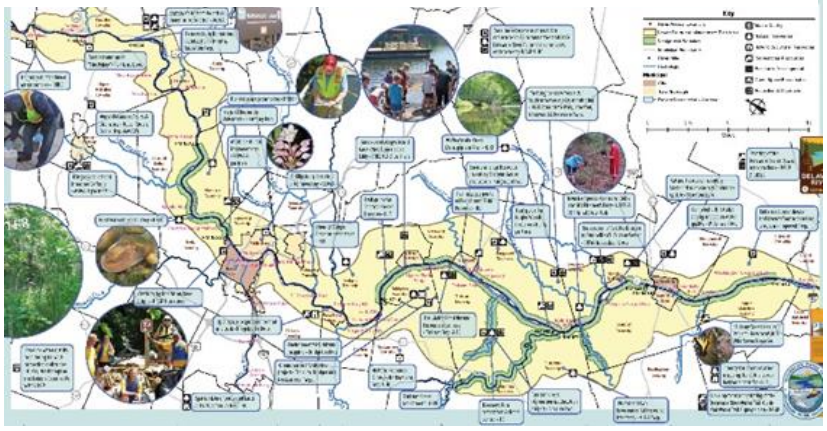
The National Park Service has issued *Accomplishments of the Lower Delaware National Wild and Scenic River Program - the First 15 Years.* The report and its companion brochure document progress in the implementation of the River Management Plan's High Priority Actions since the 65 mile stretch of the Lower Delaware was dedicated as a national Partnership Wild & Scenic River in 2000. With $1.1M in federal investment, the program engaged more than 50 organizations on more than 60 projects. Thirty-four municipalities are included in the corridor which spans five counties in two states. Successful projects represent a broad array of categories including land stewardship programs, trail development, invasive species removal, monitoring and assessment initiatives, local ordinances and resource inventories, streambank and historic restoration and the creation of outreach publications and curricula for a floating classroom.



The Lower Delaware is one of three Wild and Scenic segments of the non-tidal Delaware River. As the fifteenth anniversary closes, NPS hopes the report and brochure will prompt new partners to engage in the collaborative process of advancing the goals and protecting the special character of this scenic and recreational river. The report and brochure are available at http://lowerdelawarewildandscenic.org/reports/ and http://www.nps.gov/lode/learn/management/accomplishments-of-lower-delaware-wild-and-scenic-river-program.htm

Figure 10: Above: The Report compiled by the National Park Service documents the first 15 years of the Lower Delaware Wild & Scenic Partnership River.
Below: For the brochure, a map was created to locate more than 60 projects in the scenic corridor.





Shad Restoration & Dam Removal on White Clay Creek

Four years in the planning, Delaware's first recorded dam removal project was completed last December. Removal of the 100 foot wide 3-8 foot high Byrnes Mill Dam opened 4.8 miles of fish passage in the White Clay Creek. For the first time since 1777, Striped bass, American shad, hickory shad and other anadromous fish, are able to migrate from the Delaware Estuary into the Piedmont streams of the

Figure 11: The survival of the 237 year old dam – through floods and storms—is a testament to its sturdy 18th century construction. Sections of dam will be preserved as part of an interpretive display.

Photo: University of Delaware

White Clay Creek watershed. Sections of the large hewn timbers and hand-forged spikes that held the 18th century dam together will be displayed to serve as a visual reminder of how the dam was built to withstand floods, storms, and the changing course of the Creek for more than two centuries. In April 2015, project leader Gerald Kauffman, Director of the Water Resources Agency at the University of Delaware, documented schools of American shad and hickory shad in numerous locations in the White Clay Creek National Wild and Scenic River. Six more dams are slated for removal. The story of the Byrnes Mill dam removal was featured in a Jan 28 2015 National Geographic article on the growing movement to remove dams.

http://www.udel.edu/udaily/2015/jan/white-clay-dam-removal-013015.html

Figure 12: In April 2015, American shad (*Alosa sapidissima*) shad were sighted in the White Clay Creek for the first time in over two centuries.

Hokendauqua Creek's Atlas Dam Breached

On October 2014, after ten years of planning, the Hokendauqua Creek was reconnected to the Lehigh River with the breaching of the Atlas Dam. In the Borough of Northampton PA in 2006, the dam was the center of a local controversy pitting historic preservation against environmental restoration. The Atlas Cement Co. built the dam in 1898 to create the steam needed to make cement that went into icons of American power like the Empire State Building and the Panama Canal; the company went out of business in 1982. By 2006, the low-hazard dam was reportedly eroding from underneath, its concrete breaking up, trees growing out of its face. Steep maintenance costs precluded the Borough from purchasing the property and funds for preserving the dam could not be found. PADEP approved its removal in 2012 and awarded a $420,900 grant in 2014. The Martins-Jacoby Watershed Association, the project lead, provided a $169,000 match from NOAA for planning. Site restoration and planting was completed in April 2015. The reconnected Hokendauqua flows 17 mile from its source at the foot of the Blue Mountains to the Lehigh River.

http://hokendauqua.tu.org/hokendauqua/hokendauqua-creek

Figure 13: The 660 foot wide Atlas Dam in Northampton PA in April 2007.

Photo: H. Fisher, *The Morning Call*

3.0 LINKING LAND & WATER RESOURCE MANAGEMENT

3.1 PRESERVE AND RESTORE NATURAL HYDROLOGY

3.2 MAINTAIN FUNCTION OF HIGH VALUE WATER RESOURCE LANDSCAPES

3.3 INTEGRATE WATER RESOURCE CONSIDERATIONS INTO LAND USE PLANNING & GROWTH MANAGEMENT

3.4 ENCOURAGE DEVELOPMENT & REDEVELOPMENT WHILE PROTECTING WATER RESOURCES.

3.5 CONNECTING COMMUNITIES TO SOCIAL, HISTORIC, CULTURAL RECREATIONAL AND ECONOMIC LINKAGES.

Water trails, riverside walkways and trails are prime opportunities to re-establish a community's historic, cultural, recreational and economic link to its waterways. Across the Delaware River Basin, public and private partnerships have been busy creating functional and aesthetic access to our rivers and streams. Their efforts have yielded impressive results, as reflected in the following examples.

National Poll Names Schuylkill River Trail "*Best Urban Trail in America*"

Figure 14: The SRT runs along the Schuylkill River board-walk and crosses the Appalachian Trail on the Bartram section near Port Clinton.

Image: The Schuylkill River Trail

The Schuylkill River Trail (SRT) was voted "Best Urban Trail in America" in the USA Today's 10 Best Reader's Choice Awards poll, coming in ahead of 19 other trails around the country. Running from Philadelphia's waterfront to the rolling topography of Pottsville's seven hills, the five county SRT is still a work in progress that includes over 60 miles of finished trails, with two new sections completed in 2015.
www.schuylkillrivertrail.com/

Figure 15: With numerous places to kayak and a free bike sharing program in 3 towns, it's easy to understand why the SRT is America's #1 Urban Stream!

Photos: The Schuylkill River Trail

Upper Delaware Scenic Byway Named *Best Autumn Drive in Northeast*

The Upper Delaware Scenic Byway was voted top choice in the Northeast and ranked #2 in the entire country by USA TODAY's readers in the "Best Scenic Autumn Drive" survey. The 70-mile route has breathtaking vistas and panoramic views of the Delaware River. Running along the National Park

Figure 16: Perched 150 feet above the scenic Upper Delaware River, the Hawk's Nest portion of NY State Rte. 97 provides serpentine curves and spectacular views from six "bay window" scenic overlooks.

Photo: Upper Delaware Council

Service Upper Delaware Scenic and Recreational River, the drive links the City of Port Jervis in Orange County to the Village of Hancock in Delaware County. Emphasizing spectacular fall foliage, *USA TODAY*'s "10 Best" travel experts selected Route 97 as the only New York State highway on its list of 20 nominees. Evolving from a single lane perched high above the River, Route 97 was a New Deal project designed to access NY's southern tier counties. Taking nine years and over $4 million to complete, the roadway was a significant engineering feat to tackle in the 1930s. At its opening ceremony on August 30, 1939, it was officially dedicated as "The Most Scenic Highway in the East" and is still living up to its name. For information or to request a brochure, visit www.upperdelawarescenicbyway.org or call toll-free (866) 511-UDSB (8372).
http://www.10best.com/awards/travel/best-scenic-autumn-drive/

Bike & Boat Adventures Program Wins National Recognition

Figure 17: Kids take to the water with *Bike & Boat Adventures*.

Photo: Wildlands Conservancy

Bike & Boat Adventures, Wildlands Conservancy's biking and canoeing program highlighting the nature and history of the Lehigh River, has been recognized by American Trails, the national nonprofit organization working on behalf of all trail interests. At the 2015 International Trails Symposium held May 17-20 in Portland, OR., Wildlands' *Bike & Boat Adventures* program won the American Trails' *"Kids and Trails Award"* for efforts to engage children and youth in outdoor experiences.
http://www.wildlandspa.org/bike-boat-adventures-program-wins-national-recognition/

D&L Canal Trail Bridges Street Gap in Morrisville

The Pennsylvania Environmental Council (PEC) is working with the Delaware & Lehigh National Heritage Corridor and municipalities throughout

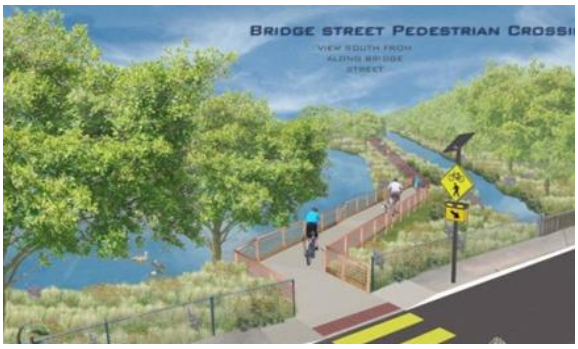


Figure 18: Artist rendering of the Bridge Street pedestrian crossing in Morrisville PA.

Image: PEC

Bucks County to eliminate obstructions and to complete the Pennsylvania section of the East Coast Greenway. In 2015, the Morrisville PA "gap" at Bridge Street was targeted. Funded through the D&L NHC and Morrisville Borough, a design was developed for an at-grade crossing. Other partners include the PA DCNR, DVRPC, East Coast Greenway, and the Friends of the Delaware Canal.

http://archive.pecpa.org/bridgestreet

Sanctuary Trail in the Little Lehigh

Pocono Forest & Waters Conservation Landscape partners improved the boardwalk along the Wildlands Conservancy's Floodplain Trail at Pool Wildlife Sanctuary in Emmaus PA. The Pool Sanctuary is a popular destination for day hikers and school program participants. Staff from Thermo Fisher Scientific have made many needed repairs during the past two years.
http://www.wildlandspa.org/pool-wildlife-sanctuary/

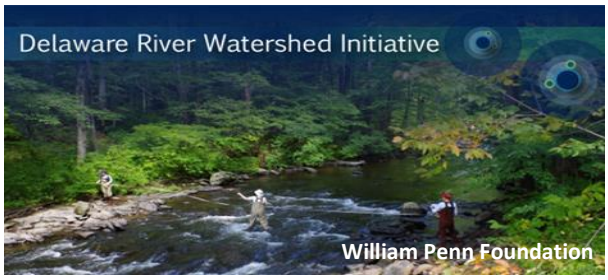
Figure 19: Volunteers from Thermo Fisher Scientific at the Pool Wildlife Sanctuary in Emmaus PA.

Photo: Wildlands Conservancy

4.0 INSTITUTIONAL COORDINATION AND COOPERATION
4.1 IMPROVE COORDINATION & COLLABORATION
4.2 INCREASE SHARING OF DATA & IDEAS
4.3 SECURE ADEQUATE RESOURCES FOR COOPERATIVE PLANNING AND MANAGEMENT
4.4 ENSURE ACTIONS IN ACCORDANCE WITH THE BASIN PLAN
4.5 USE DRBC REGIONAL AUTHORITY TO FACILITATE COORDINATION & COOPERATION

Unprecedented Institutional Collaboration

There is a recent and unprecedented alignment of institutional coordination and cooperation in the Delaware River Basin that is generating a paradigm shift for watershed-based regional water resource management. By adopting a common goal to "protect and restore" the basin's critical water resources within a common framework, over 50 national and regional organizations are now synergistically achieving unparalleled momentum and successes.



❖ In April 2014, the William Penn Foundation (WPF) launched its Delaware River Watershed Initiative (DRWI), injecting $35 million in grant monies over 3 years to protect and restore the basin's critical water resources. Major grants were awarded to coordinating organizations that include the Academy of Natural Sciences (ANS), National Fish and Wildlife Foundation (NFWF), Open Space Institute (OSI), and The Institute for Conservation Leadership (ICL). These groups enabled bridge loans and re-grants for local organizations and projects supporting DRWI goals. The funding and efforts also complemented existing Federal and state conservation programs throughout the basin and encouraged additional investment. WPF adopted eight groupings of priority sub-watersheds or "clusters"—initially identified by the ANS/Drexel University's Patrick Center for Environmental Research and OSI—as specific target areas for restoration and protection. ANS received $3.2 million to develop baseline water quality data and integrate its 70-year watershed research and monitoring efforts into new datasets and models. http://www.ansp.org/research/environmental-research/projects/watershed-protection-program/

♦ In July 2014, NFWF announced a $7 million WPF-financed Delaware River Restoration Fund dedicated to community-based nonprofits and government agencies. The first grant round awarded $2.4 M for projects. By that autumn, 14 partners were funded for 15 projects in 2 states.

- Pennsylvania partners include the Brandywine Conservancy, Brandywine Valley Association, the Tookany/Tacony-Frankford Watershed Partnership; Stroud Water Research Center; Schuylkill Action Network, Berks County Conservancy; Lower Merion Conservancy; Pennypack Ecological Restoration Trust; Pennsylvania Resources Council; Brodhead Watershed Association, Temple University and Villanova.
- New Jersey partners include The Nature Conservancy, NJ Conservation Foundation, NJ Audubon, American Littoral Society, Pinelands Preservation Alliance, Musconetcong Watershed Association, and Association of New Jersey Environmental Commissions.

♦ The Open Space Institute (OSI) received $10 million to seed the Delaware River Watershed Protection Fund, expected to conserve approximately 7,200 acres and protect drinking water supply for millions of residents in the region. OSI's first investment effort was with the Trust for Public Land to purchase Mosiers Knob, a 550-acre parcel that expanded the Delaware Water Gap National Recreation Area. The National Park Service, The Conservation Fund, the PA Department of Conservation and Natural Resources, and the Doris Duke Charitable Foundation worked together to secure the purchase.

Dozens of DRWI projects are underway, including one effort with the University of Delaware's Water Resource Agency (UDWRA) and The Nature Conservancy's Delaware chapter for a feasibility assessment of a "water fund" for the Brandywine-Christina (one of the 8 clusters); that is, a financial mechanism where downstream beneficiaries invest in upstream conservation and restoration measures to secure the integrity of water resources.

❖ USDA Targets the DRB with the RCPP

The US Department of Agriculture (USDA) is providing $15 million for projects in the Delaware River watershed through its Regional Conservation Partnership Program (RCPP), which supports stakeholder-driven, local efforts to leverage private sector investment in conservation. The Natural Resources Conservation Service (NRCS) is contributing matching funds and in-kind services such as outreach and technical assistance to this effort led by the American Farmland Trust (AFT), National Fish and Wildlife Foundation and Stroud Water Research Center. The targeted funding includes:

- **Delaware River Watershed Working Lands Conservation and Protection Partnership**

  Funding: $13 million

  Purpose: States of Pennsylvania and New Jersey water conservation projects, including land protection easements, are being implemented through NRCS by working with more than 600 farmers and forest landowners on 35,000 acres in this important region.

- **Productive Farms and Clean Streams for Berks and Chester Counties**

  Funding: $1.5 million

  Purpose: Stroud Water Research Center is improving water quality in Berks and Chester Counties by reducing nutrients and sediments in surface and groundwater and improving fish and wildlife habitat. Various methods to provide cost-effective conservation practices to farmers will be used to help address water quality, soil erosion, fish and wildlife habitat, and air quality.

- **Delaware Bay Soil and Water Quality Protection Initiative**

  Funding: $700,000

  Purpose: The New Jersey Conservation Foundation (NJCF) will focus on protecting farm and forestland in the Delaware Bay area of New Jersey through easement acquisitions and increasing NRCS conservation projects.

Youth Corps Restores the Musky

Figure 20: NJ Youth Corps of Phillipsburg NJ putting their restoration knowledge to work in the Musconetcong.
Photo:The Corps Network

The NJ Youth Corps of Phillipsburg worked on riparian restoration projects with landowners, the Musconetcong Watershed Association, North Jersey Resource Conservation and Development Program, and the NJ Audubon Society. Over a mile of stream bank along a "Musky" tributary was stabilized by planting trees to establish a corridor canopy, prevent soil erosion, reduce thermal pollution and improve wildlife habitat. Youth Corps members had recently completed *Waders in the Water* training, an industry-recognized credential in aquatic restoration. Launched in May of 2014 by The Corps Network and Trout Headwaters, Inc., *Waders in the Water* certification qualifies youth and veterans to enter conservation careers by learning how to improve the health, productivity, and climate-resiliency of streams, rivers, and wetlands.
https://www.corpsnetwork.org/waders

5.0 EDUCATION AND OUTREACH FOR STEWARDSHIP

5.1 ESTABLISH A BASIN-WIDE SENSE OF PLACE

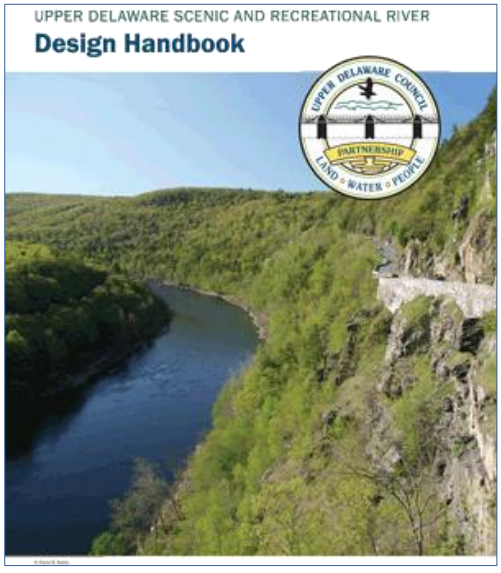
INCREASE WATER RESOURCE AWARENESS, UNDERSTANDING & PARTICIPATION AMONG:

- 5.2 YOUTH & STUDENTS
- 5.3 THE PRIVATE SECTOR
- 5.4 LOCAL PUBLIC OFFICIALS

Outreach and education are crucial tools for ensuring that our water resources are continuously valued and protected. The following initiatives are but a few of new and ongoing efforts to secure the future.

UDC Updates Design Handbook

The Upper Delaware Council (UDC) announced the release of the updated "Design Handbook for the Upper Delaware Scenic and Recreational River." The Design Handbook provides guidance for building and development projects along the Upper Delaware River in ways that ensure harmony with the existing river landscape. It summarizes technical aspects of the *Land and Water Use Guidelines,* which were developed to implement federal legislation that created the Upper Delaware Scenic and Recreational River in New York and Pennsylvania. The resulting 36-page document is currently available as a downloadable file on the Council's website at www.upperdelawarecouncil.org.



Brodhead "Adopt a Streamside" Program

This year marks 25 years of the Brodhead Watershed Association's *Streamwatch* program. Located in Monroe County PA, seventy volunteers have been continuously collecting monthly water quality data from nearly 100 sites to provide a long-term snapshot of stream health. To support these monitoring efforts, BWA created "*Adopt a Stream-site*," which allows businesses and organizations to support BWA, including the *Streamwatch* monitoring. Currently, 29 businesses and organizations serve as Stream site sponsors and stewards. According to the June 2015 *Catskill Chronicle* and an earlier BWA newsletter, "BWA has been selected to spread the value of water quality monitoring, and will train organizations in the upper Delaware River watershed on its *Streamwatch* protocols as part of a Nature Conservancy contract to protect the headwaters of the Delaware River." For information on *Adopt-A-Streamsite* sponsorship or BWA's *Streamwatch* volunteer monitoring, visit: http://www.brodheadwatershed.org/streamwatchers.html

Rain Garden Technical Assistance Program

The Rutgers Cooperative Extension's Water Resource Program (RCE-WRP) and Hamilton Township NJ partnered to create a rain garden technical assistance program to provide guidance for residents to install individualized rain gardens. Residents learned about the function, installation and maintenance of rain gardens to help reduce flooding, address drainage issues, and improve water quality in local streams. Interested homeowners collected information about their properties so that WRP staff could design a rain garden to address their specific needs. Six homeowners returned for a technical review of their sites. WRP identified best locations for their rain garden. WRP staff then developed unique plant palates and layout designs for four rain gardens and a bioswale, and provided advice on improving

foundation drainage. The Water Resources Program is funded by the New Jersey Agricultural Experiment Station (NJAES), which receives state and federal financial support.
water.rutgers.edu.

Figure 21: Thanks to the Rutgers Cooperative Extension, homeowners in Hamilton Twp. NJ learned about the benefits of rain gardens, and received custom designs for their properties.

Photo: RCE-WRP

Stroud Water Research Center Recognized for Outstanding Education Programs

The innovative and engaging educational programs at Stroud Water Research Center (Stroud) led to it being awarded the *Outstanding Environmental Education Program* Award from the Pennsylvania Association of Environmental Educators (PAEE). The *Leaf Pack Experiment Stream Ecology Kit* and *Stream School* programs are just two that incorporate Stroud's "Hands-on, Boots-in-the-Water" approach to education. Stroud has reached over 52,000 people during twenty-five years of educational programming. With the *Leaf Pack Experiment Stream Ecology Kit*, students learn to design, implement, and analyze a scientific investigation while discovering the value of aquatic macroinvertebrates as living indicators of water quality. The companion *Leaf Pack Network®* enables students and citizen scientists to post and compare data generated by leaf pack experiments performed in their local streams on the Web. *Stream School* is available for students in the 4th grade and above and can be used in Stroud's research watershed or customized for off-site class needs. The Education Improvement Tax Credit (EITC) program allows Stroud Center to offer programs at no cost for grades 4 and above in Pennsylvania public schools, so if a school cannot travel to Stroud, staff can travel to the school.
http://www.stroudcenter.org/education/index.shtm

Figure 22: Stroud's award-winning "hands-on, boots-in-the-water" approach creates unique learning opportunities in the field and in the lab.

Photos: Stroud

In Stewardship for the Christina

In April, volunteers gathered for the 24th Annual Christina River Watershed Cleanup. Individuals and groups representing a variety of organizations worked together, collecting more than 23 tons of trash, tires and recyclables. Support for the event is provided by businesses and non-profit organizations. The Christina watershed provides more than 75% of the water supply for New Castle County Delaware.
http://www.christinarivercleanup.org/

Figure 23: The Jawalla Scouts helped collect 23 tons of trash and recyclables from the Christina River last April.

Photo: Partnership for the Delaware Estuary

DRBC Cares for Communities

To emphasize its commitment to public service, and to encourage team work, DRBC's Executive Director asked staff to identify opportunities and participate in group projects in basin communities. This past year, five teams engaged in community service projects focused on watershed cleanups and community improvement:

• **Rescue Mission of Trenton** — Two DRBC teams spent parts of two days beautifying the Rescue Mission's courtyard gardens, weeding and digging trenches for walkways that will connect the picnic areas to other spaces. They also helped frame artwork that was auctioned off in June at the *Art All Night Trenton*; proceeds from that annual event benefit the Rescue Mission.

Figure 24: Beautifying the courtyard for the Rescue Mission of Trenton.

Photo: DRBC

• **Miry Run Cleanup —** Another DRBC team spent a day cleaning up a section of Miry Run, a tributary to the Assunpink Creek in Warwick Park, Hamilton Township N.J. While some of Warwick Park is landscaped, the natural areas along Miry Run are not formally maintained. Due to its proximity to a commercial plaza and large residential neighborhood, trash and other debris frequently end up in this waterbody, which flows through wetlands and is home to various wildlife. Staff were assisted by DRBC-hosted Americorps N.J. Watershed Ambassador Jordan Foreman and also by coordinators with N.J. Clean Communities of Hamilton, who provided gloves, poison-ivy repellant (a welcomed gift), litter grabbers, and trash bags and

Figure 25 DRBC staff with one of the major finds of the day. The Miry Run cleanup was organized by DRBC-hosted NJ Watershed Ambassador Jordan Foreman, center.

Photo: DRBC

hauled away all of the collected trash and recyclable materials. Items large and small were removed, including a tractor tire, lawn chairs, a shopping cart and even a "No Dumping" sign.

• **Lower Delaware Cleanup —** Additional DRBC staff spent a day cleaning up a section of the Lower (non-tidal) Delaware River between Lambertville, and Milford, N.J. Using DRBC's boat, the crew was able to target sites that are frequently used by the public, but are not within specific park boundaries and therefore are not routinely maintained. Trash, recyclables (glass and plastic bottles and cans), and tires were gathered from multiple sites along the Pa. and N.J. shorelines and from several islands in the river. Removing trash from waterways helps to improve water quality and habitat. Items large and small were removed, totaling roughly 20 bags of trash and multiple tires!

Figure 26: Loaded but still afloat, DRBC staff and boat head for shore.

Photo: DRBC

• **Pennsauken River Shoreline —** In spite of the summer's heat and humidity, the DRBC team enjoyed working alongside staff from Living Lands and Waters, the Philadelphia Water Department, and the Adventure Aquarium on a great cause. Volunteers traveled by boat to access shoreline areas not easily accessible by foot. Unfortunately, there was no lack of "bounty" as multiple bags of trash and recyclables were collected and properly disposed of by the team. The view from the shore and from the bridge is much improved.

Figure 27: DRBC staff pose with a boatful of trash cleared from the shore of the Delaware River near the Tacony-Palmyra Bridge.

Photo: DRBC